Comparison of the VTX detector response to test beam data.

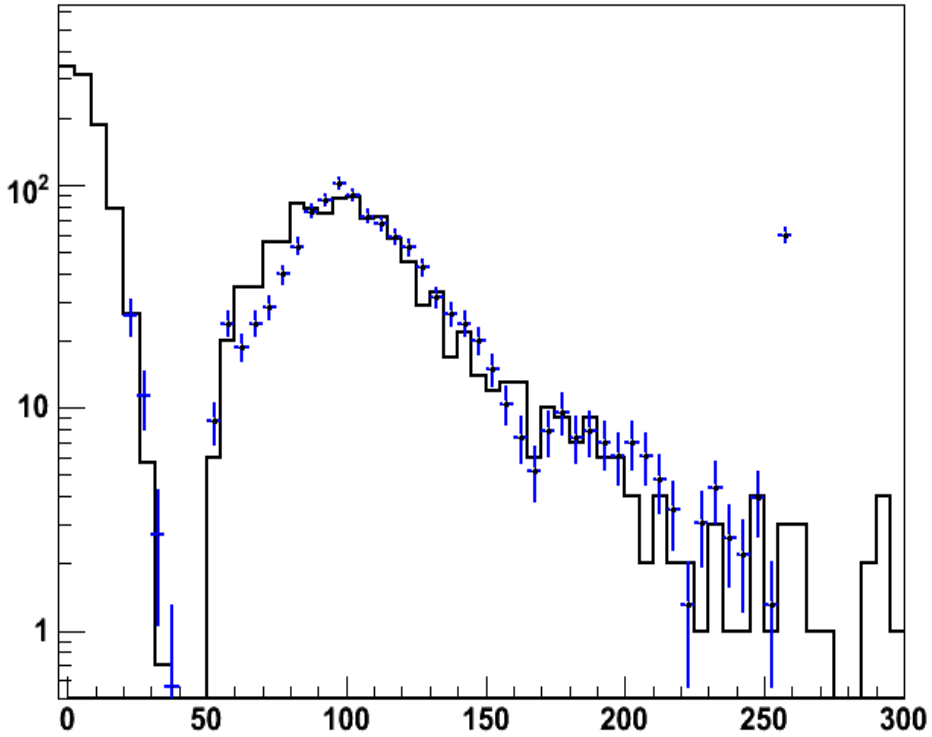
Recommendation 2: Simulations to reproduce the Fermilab 120 GeV proton beam data should be carried out, including charge sharing. This should be done quickly within one month and summarized in a brief note. In particular, we would like to see the x and u strip hit distribution and noise data reproduced both with the simulation as it is currently, and with the simulations correctly tuned (if necessary) to adequately reproduce the test beam data. For completeness, a similar study should be done for the pixels.

Analysis note was written and submitted to the review committee about a week ago. This is a short summary of the note.

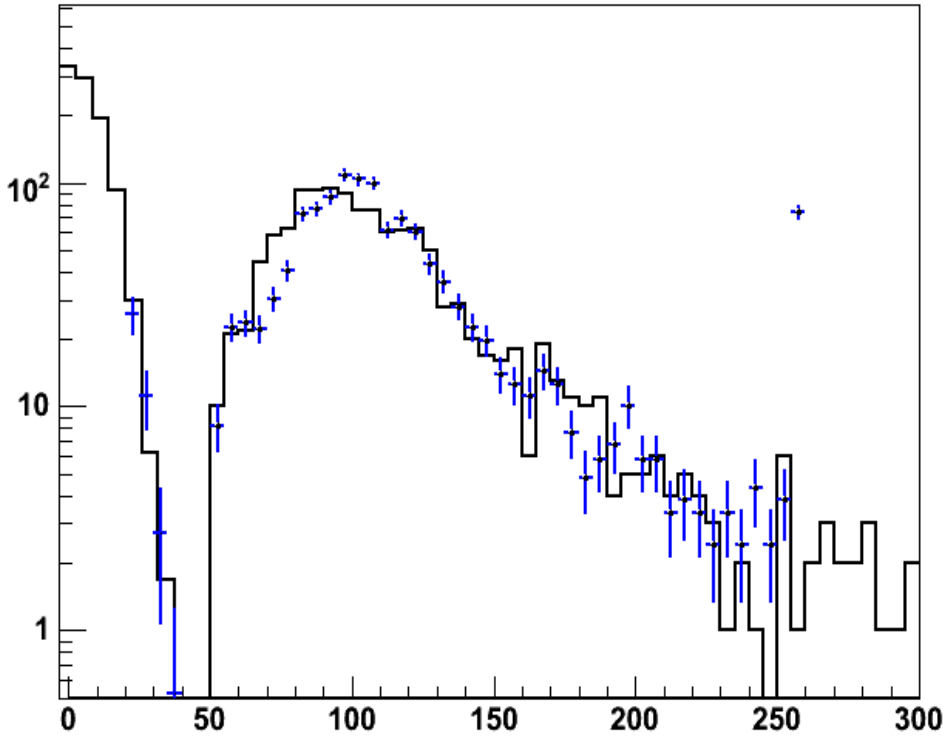
Stripixels: ADC distributions

Blue – simulation
Black - data.

X readout



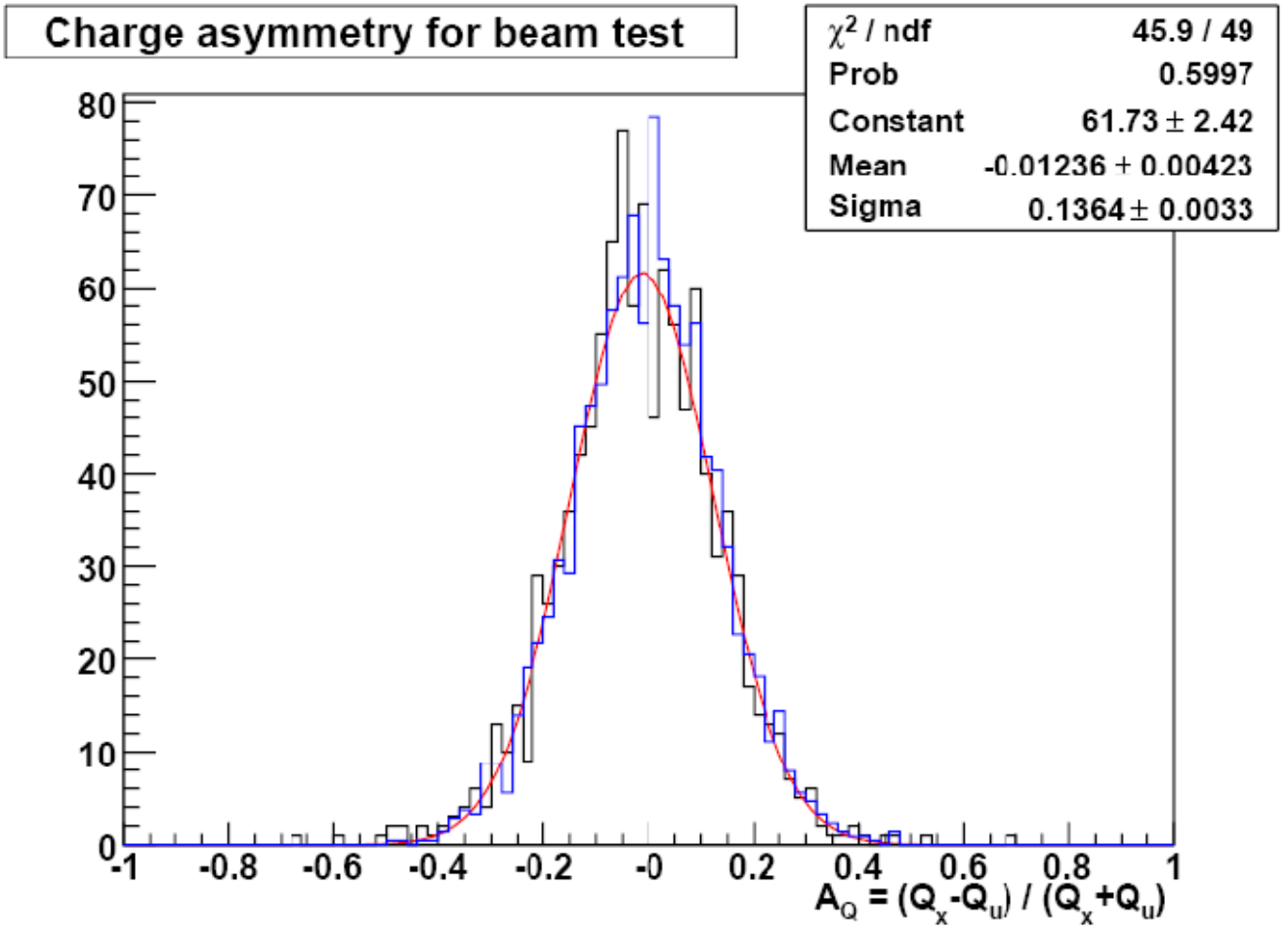
U readout



Good agreement both in most probable peak position, shape and signal-to-noise ratio. No changes were necessary.

Stripixels: X/U charge sharing

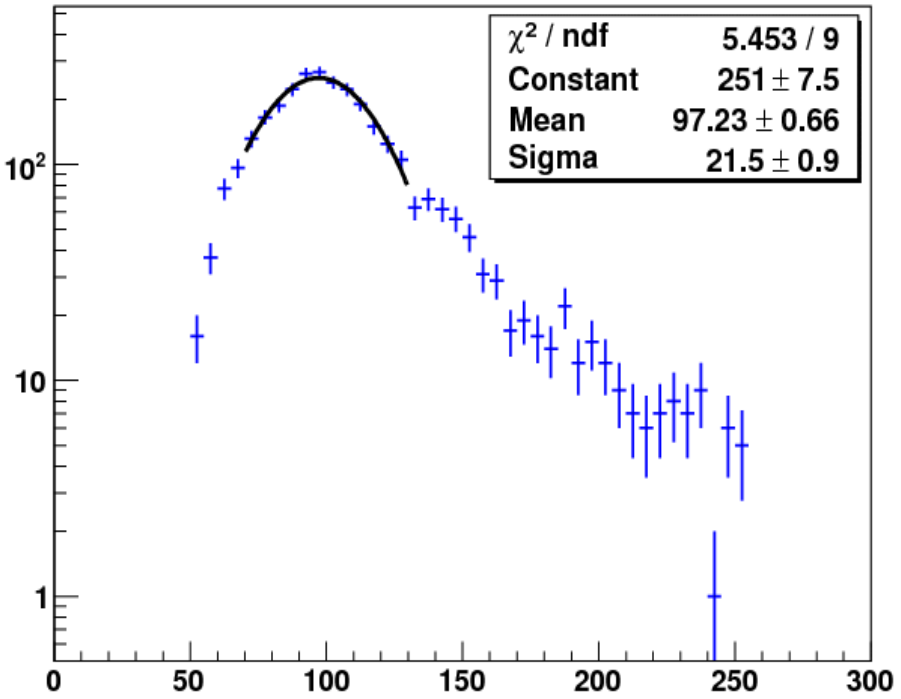
Blue – simulation; Black – data; Red – fit to data.



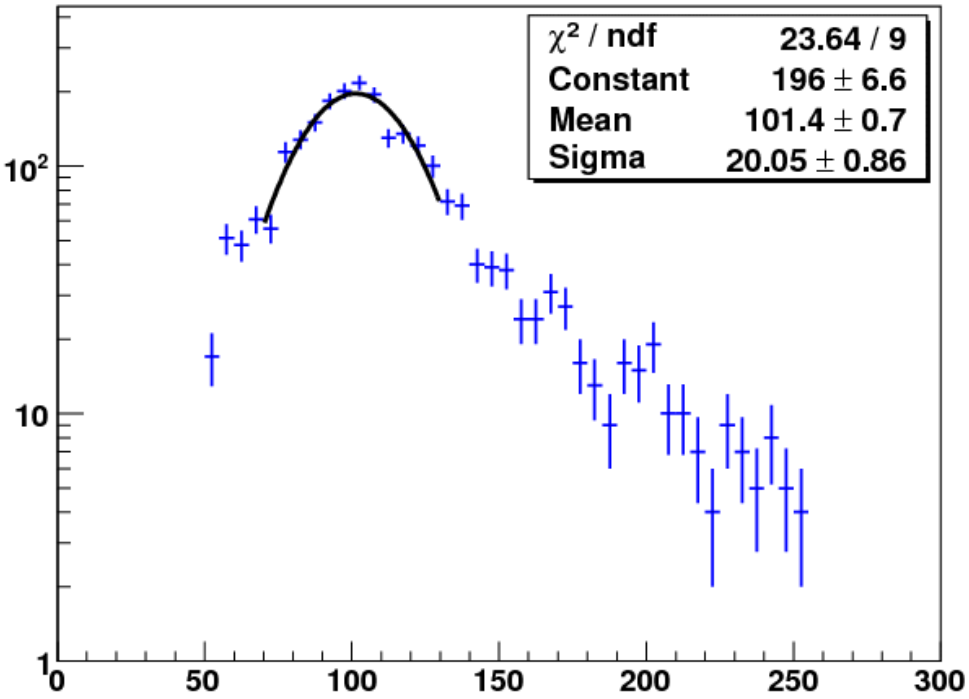
Charge sharing parameter had to be slightly adjusted from 0.1 to 0.109

Stripixels: comparizon of 120 GeV protons to MIPs

3.4 GeV protons (MIP)

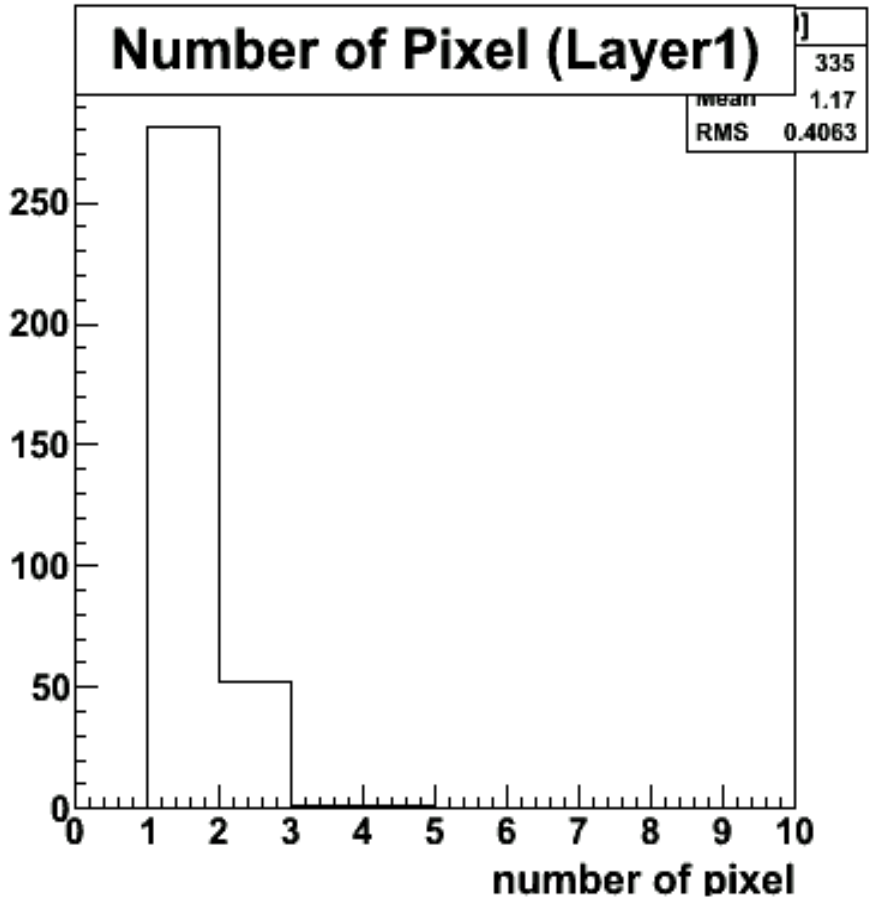


120 GeV protons

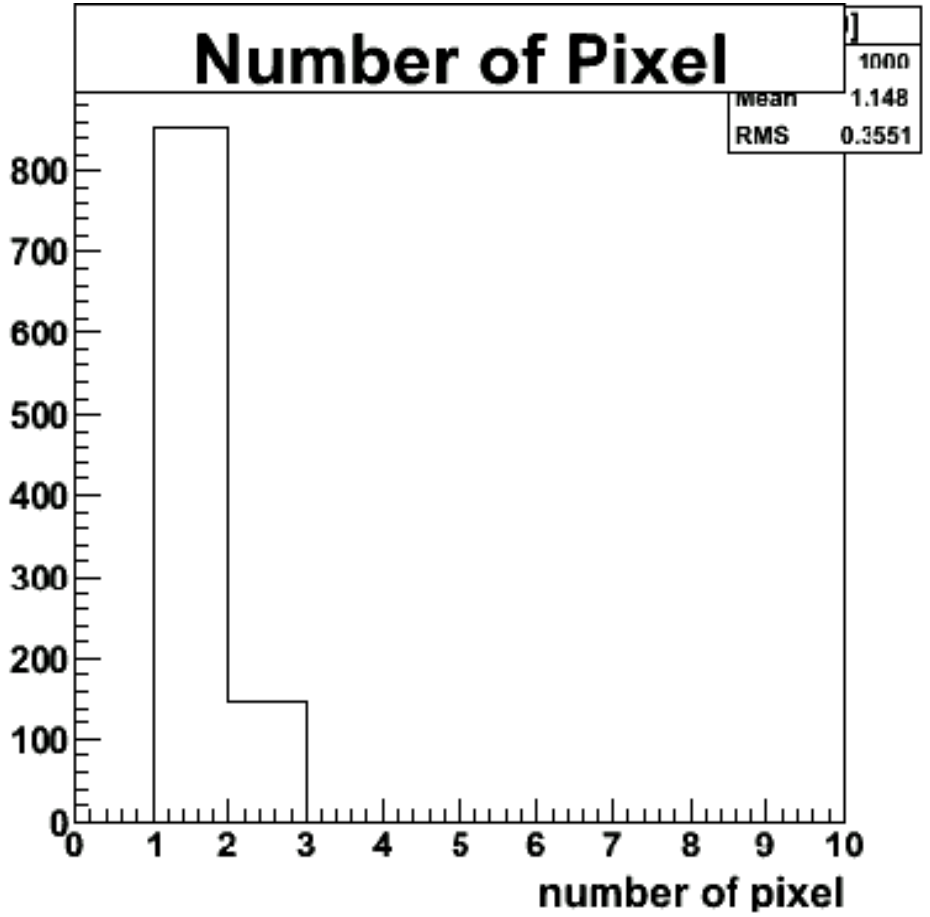


Pixels: number of fired pixels

data

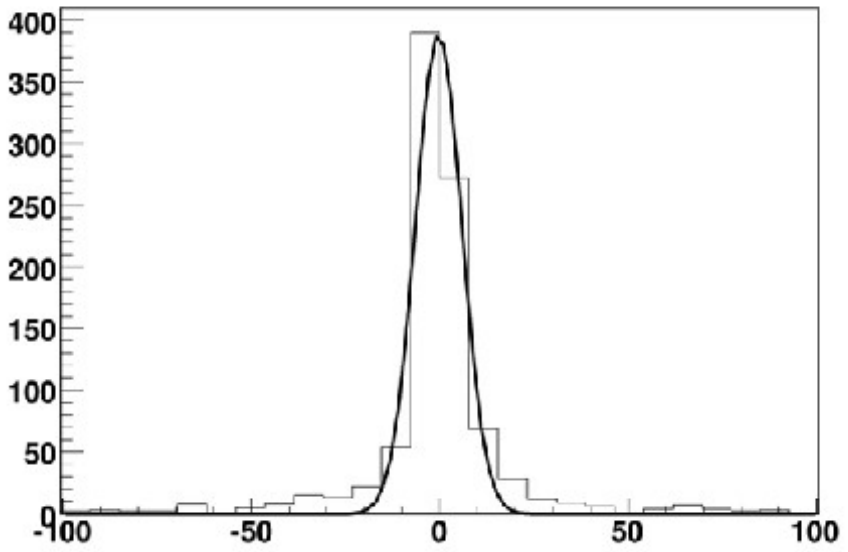


simulation

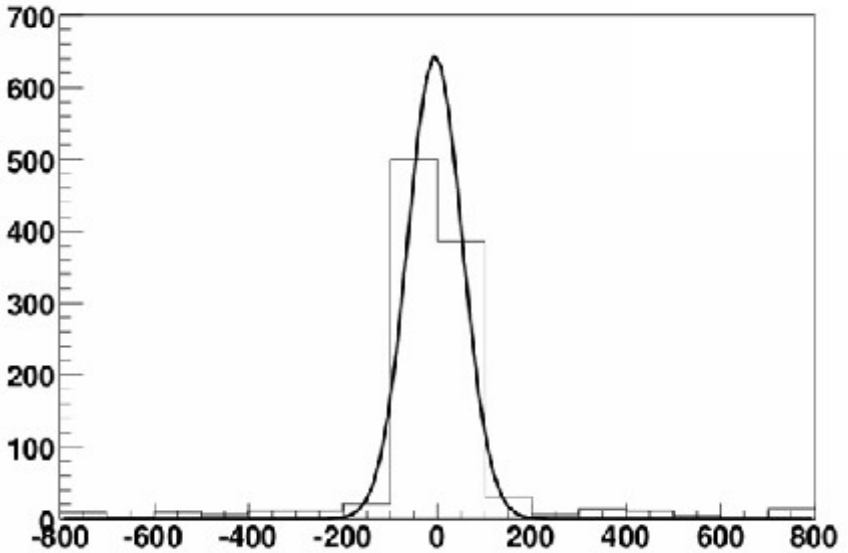


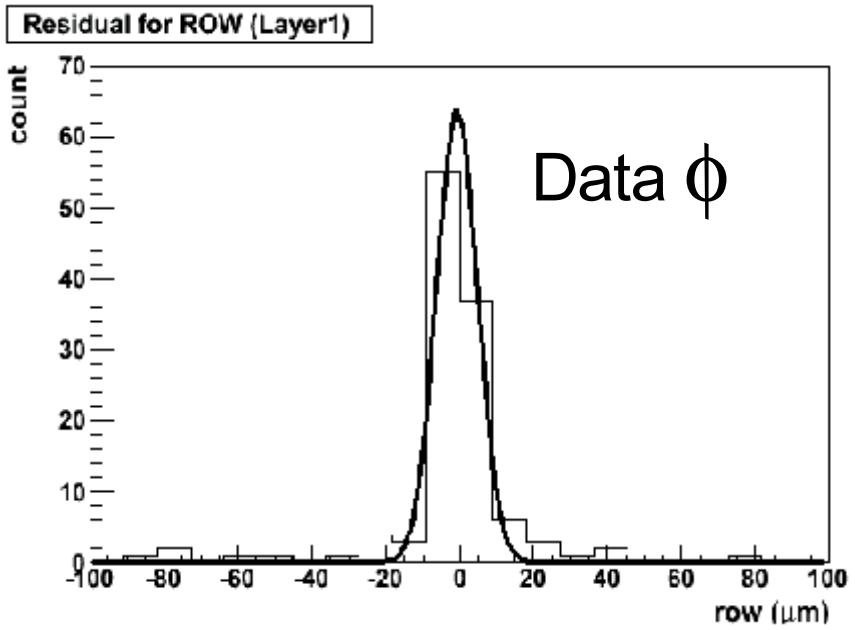
Pixels: space resolution

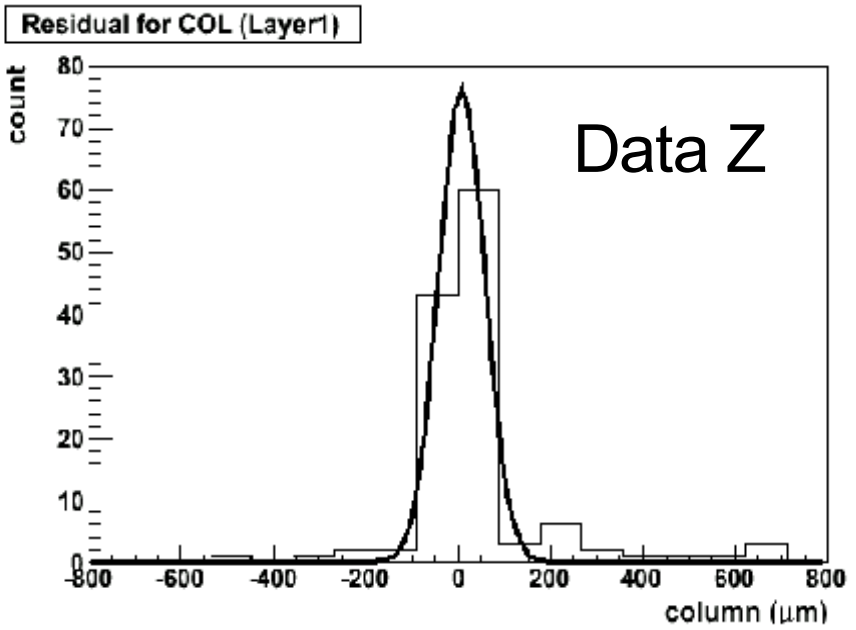
Simulation ϕ



Simulation Z







Summary of simulation parameters

Pixel layers parameters are unchanged.

Stripixel layers parameters:

	old	new
ADCGain	0.0038	0.0038
X/U charge sharing Gaussian width	0.100	0.109
Gaussian width of noise (ADC channels)	10	10
Noise cutoff (ADC channels)	21	21
Clustering threshold (ADC channels)	40	40

Summary

- VTX detector response was calibrated for two outer stripixel layers using 120 GeV simulated protons and compared to the results of a test beam measurements at Fermilab.

- Most probable energy deposit was already calibrated properly, because 5-20 GeV pions used for the original calibration had approximately the same most probable energy deposit as 120 GeV protons.

- Signal to noise ratio was already correct in the original calibration.

- Charge sharing parameter between X and U readouts had to be increased from 0.10 to 0.109 in order for the simulation to reproduce properly the test beam results.

- The difference in most probable energy deposit between 120 GeV protons and MIPs is 4.3%. Thus, the FNAL beam test results show that the S/B of the stripixel detector is 10 for one readout channel.

- For the pixel layers simulation properly reproduces number of pixels in a cluster and space resolution in both phi and *Z* directions.